FEED GRAINS AND HAY: DIFFERENCES BETWEEN EARLY-SEASON AND FINAL ESTIMATES OF SUPPLY AND DEMAND FACTORS USED IN MAKING OUTLOOK FORECASTS 1/

by

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Summary

Forecasts of production of feed grains and most hays by the Crop Reporting Board first begin in July. These forecasts are based on estimated acreage and the condition of the crop or the probable yield expected by producers on the first of the month, and assume average weather, disease, and insect conditions for the remainder of the growing season. Forecasts then are issued in successive months through harvest, and a preliminary estimate of production is issued in December.

In the July report on corn production, for example, the Crop Reporting Board reports the production that is expected as of July 1. Many unpredictable factors, such as hail, excessive rain, and drought, during later months may cause final production to differ from that which is expected as of that date. Naturally, no account can be taken of these events and the best assumption to make is that conditions during the remainder of the season will be average. The economic analyst wants the best estimate of the crop as of July 1, based on what is known thus far in the marketing season. Assuming no consistent statistical bias in the forecasts, the best indication of actual production as of that date is the figure contained in the report released by the Crop Reporting Board. At the same time, however, the economic analyst wants some idea of the reliability of these forecasts. That is, he wishes to know what proportion of the factors that affect final production is known, on the average, by July 1, and therefore are reflected in the forecast of the Crop Reporting Board, and what proportion is unknown and hence may affect the final outturn during the remainder of the season. This report is concerned with providing measures of this type, both for the estimates of the Board and for certain other factors that are taken as "given" in price analysis work.

1/ The research on which this report is based was carried on under authority of the Agricultural Marketing Act of 1946 (RMA, Title II).

This is third in a series of studies giving information of this type. Reports covering wheat, rye, and rice, AMS-38, and oilseeds and fats and oils, AMS-63, can be obtained by writing the Division of Marketing Information, Agricultural Marketing Service, U.S. Department of Agriculture, Washington 25, D. C.

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No statistical bias was found in the early-season forecasts of feed grains and hay. As would be expected, differences between early-season and December figures, on the average, diminish steadily as the season advances (Fig. 1). The percentage of variation in the estimate in the December crop summary associated with each of the preceding monthly forecasts is shown in figure 2 and discussed briefly in succeeding paragraphs. Beginning with the respective months of harvest for the feed grains and the total hay crop, year-to-year indications of production are found to be closely associated with year-to-year changes in estimates published in December.

Forecasts of the supply of feed concentrates appear in certain issues of The Feed Situation. As was true for forecasts of crop harvests, differences between early-season and preliminary figures at the end of the feeding year, on the average, diminish steadily as the feeding season progresses. Analyses of data available for the period 1944-53 suggest that at the beginning of the feeding year in October, approximately 97 percent of the year-to-year variation in total supply of feed concentrates can be forecast. Adjustments in succeeding months increase this percentage. For the period 1939-53, forecasts in October of grain-consuming animal units to be fed during the forthcoming October-September feeding year explained about 93 percent of the year-to-year variation in the final figures. Not enough data from these series were available to warrant a test for bias.

Advance forecasts of probable changes in the level of disposable income from the preceding feeding year also are made in October. These forecasts account for 85 to 90 percent of the actual variation.

Preliminary estimates of season-average prices for the United States are issued by the Crop Reporting Board annually in December and May, respectively, and estimates are revised in the year following. In these series, State prices are weighted by production and sales, respectively. With the exception of sorghum grains, year-to-year changes in simple averages are associated with at least 96 percent of the year-to-year variation in the weighted average. Hay is the only one of these crops for which the results differ significantly depending on the alternative weights used. For all crops except corn, the preliminary December estimate is a close approximation to the final season-average price.

Background of Study

Analyzing future trends in prices is an important part of situation and outlook work. Such studies frequently are made in advance of harvest to guide producers and handlers in planning their operations during the marketing season. They are brought up-to-date as the marketing season progresses. The reliability of these analyses depends on (1) knowledge of the basic relationships that prevail between price and certain "causal" variables, such as supply and general business conditions, and (2) the agreement of the early-season estimates of these causal factors with later or final estimates.

Foote 2/ showed that during the period 1921-50, 95 percent of the variation in the price of corn was associated with variations in the supply of feed concentrates, grain-consuming animal units fed annually, and prices received by farmers for livestock and livestock products. Basic supply and demand variables of this sort probably account for a substantial part of the variations in prices for other feed grains and hay. In recent years, Government support programs and other governmental actions also have had important effects on the level of prices.

The research project discussed here is a first step in measuring factors that affect the reliability of early-season estimates of future price trends. It is designed to measure in a systematic way relationships between early-season forecasts of domestic supply and demand variables and the final figures. Related research that deals with season-average prices also is described. One problem in connection with an analysis of this kind is that forecasts of causal factors used in preparing situation and outlook reports frequently are not systematically recorded. Of necessity, analyses reported here are confined to those factors for which forecasts have been recorded. They include forecasts and estimates of production and season-average prices for feed grains and hay made by the Crop Reporting Board, forecasts of the supply and utilization of feed concentrates and number of animal units fed published regularly in The Feed Situation, and forecasts of trends in general business conditions issued for use within the United States Department of Agriculture by the Farm Income Branch of the Agricultural Marketing Service. Of the latter, personal disposable income alone is analyzed. In another analysis, Foote 3/ shows that for the period 1921-42, livestock production and disposable income jointly are of importance in affecting changes in livestock prices. Together, they explain more than 95 percent of the variation in prices of livestock and livestock products. This close association provides the basis for considering disposable income in this study, as advance estimates recorded in tabular form are not available for prices of livestock and livestock products.

The discussion in this report is divided into the following sections: (1) Disposable income, (2) production forecasts for feed grains and hay (3) forecasts of supply and utilization of feed concentrates and number of animal units fed, and (4) estimates of season-average prices. Historical series for the several items were compiled with the cooperation of members of the staffs of the agencies that initially prepare them. These staff members also assisted in planning this study and reviewing the results. Methodology pertaining to analyses that follow is similar to that for oilseeds and fats and oils and is outlined in detail in a publication relating to these items. 4/

2/ Foote, Richard J. Statistical Analyses Relating to the Feed-Livestock Economy. U. S. Dept. Agr. Tech. Bul. 1070, pp. 5-12, 18-20. 1953.

3/ Ibid., pp. 18-20.

4/ Weingarten, Hyman. Oilseeds and Fats and Oils: Differences Between Early-Season and Final Estimates of Supply and Demand Factors Used in Making Outlook Forecasts. U. S. Agricultural Marketing Service AMS-63. 1956.

Disposable Income

Each fall and spring the Farm Income Branch of the Agricultural Marketing Service prepares forecasts of the principal series that relate to overall economic conditions for about a year ahead. These forecasts are intended for use by commodity analysts and other research workers within the Agricultural Economics Division who prepare outlook and situation reports. A record of these forecasts from 1948 to the present time is available on ditto sheets and discussions of them are found in the files of The Demand and Price Situation, in which such discussions are carried regularly. Estimates of disposable income by quarters are prepared by the Department of Commerce and published in the Survey of Current Business. Revisions of income data appear in the February and July issues; subsequent revisions are made from time to time as new series and new methods are developed. These frequently result in moderate changes in level for all or part of the series. Because of these changes in level and irregularity in timing of the revisions, forecasts of the series are compared with the first revision issued after the date of forecast. Thus, for analytical purposes, the forecast and its revisions have the same base. As is noted in subsequent paragraphs, this procedure is similar to the way in which comparisons are made for forecasts of production published by the Crop Reporting Board.

For some studies of future trends in prices, emphasis is placed on the average level during the marketing year; for other studies, it is placed on the average level during shorter time periods, such as fall or spring. As an indication of the accuracy of the forecasts of general economic conditions in relation to these two types of studies, two sorts of comparisons were made: (1) Relationships between forecasts of the season-average level of the factor and the revised figure for the feeding year and (2) relationships between the forecast for a specific quarter and the revised quarterly figure. The 4 quarters within the year need not be distinguished one from another in an analysis of this sort as all of the general economic series are adjusted for normal seasonal variation.

Because of the short period for which recorded forecasts are available, these analyses are less reliable as indicators of the exact degree of difference between the early-season forecasts and the revised estimates than are those based on forecasts made by the Crop Reporting Board. For this reason, results are not shown in tabular form and the discussion in the following paragraphs is given in general rather than specific terms. Forecasts were underestimated in 1950 because of the outbreak of the Korean conflict. Since an abnormal observation in a short series can distort statistical results, data for 1950 were excluded from these analyses.

As discussed on p. 6 , one way to study the relationships between early early-season forecasts and revised or final estimates is in terms of the percentage of associated variation in the two series. Analyses in each case are based on year-to-year changes in the estimates associated with forecast changes from the preceding year.

The fall forecast of disposable income, usually made in October, can be regarded as an early-season forecast when figures are compiled on a feeding-year basis. In terms of a feeding-year average, between 85 and 90 percent of the variation in year-to-year changes in the revised estimate was associated with the fall forecast, and almost 98 percent with the spring forecast, issued approximately 6 months later. Timing of the forecast in relation to the estimate is somewhat different when working with calendar-year averages. Nevertheless, between 85 and 90 percent of the variation in the revised estimate is associated with the forecast issued in the preceding fall, about 95 percent with the forecast issued in the current fall.

In analyzing data by quarters, no distinction was made between forecasts issued in fall or spring. Instead, the forecasts were classified as those made 1 quarter in advance, those made 2 quarters in advance, and so on. As of the date of forecast, data would not be issued for the current quarter, so that in effect this represents a forecast on the part of the analyst and is classified as being made 1 quarter in advance. The percentage of variation in year-to-year changes in revised estimates associated with the forecast change from the preceding year was more than 99 percent for those forecasts made 1 quarter in advance, approximately 90 percent for those made 2 quarters in advance, and about 80 percent for forecasts made 3 and 4 quarters in advance.

Production Forecasts for Feed Grains and Hay

The first forecast of production of corn is published by the Crop Reporting Board in July; similar forecasts are issued monthly thereafter through November. These forecasts are based on estimated acreage and the condition of the crop or the probable yield expected by producers on the first of the month, assuming average weather, disease, and insect conditions for the remainder of the growing season. The estimate of production issued in the December annual summary report is preliminary and a revised estimate is published in the report in the following December. A further revision, based on census benchmark data every 5 years, is made as soon as possible after such data become available. In this study we refer to the several sets of estimates here described, respectively, as "preliminary December," "revised December," and "final" figures. Similar information is issued for oats, barley, sorghum grains, alfalfa, clover and timothy, lespedeza, and all hay.

Differences Between Early-Season and Final Production Estimates.-- One way in which differences between early-season forecasts and final production estimates can be studied is in terms of the standard deviations of such differences. With the kind of data analyzed in this study, the size of the standard deviation directly indicates the size of the differences of any given

monthly forecast from the preliminary December production estimate. 5/ On the average, differences that are greater than the computed standard deviation occur approximately one-third of the time. In 1 year out of 20, differences are expected to exceed two standard deviations; differences greater than three standard deviations are rare.

A July forecast for corn, for example, was first published in 1912. Based on data for 1912-54, the computed standard deviation of the difference between this forecast and the preliminary December estimate is 319 million bushels, or 12 percent of the average crop for the period. In 14 out of 43 years, the actual differences (plus or minus) were greater than 319 million bushels; they were less than this in the remaining 29 years. In 3 out of 43 years, the actual differences were greater than 638 million bushels--two standard deviations. In no case was the actual difference greater than three standard deviations.

For the August forecast, the standard deviation of its difference from the preliminary December estimate is 192 million bushels. This declines to 109 million bushels in September, to 75 million bushels in October, and to 49 million bushels in November. Figure 1 shows standard deviations in million bushels based on data for the periods 1912-54, 1925-54, and 1936-54. The lines for the three periods are nearly identical.

Table 1 shows standard deviations in actual units and in terms of percentages of an average crop for each commodity included in this study for specified periods. As a percentage of the crop, the differences are substantial for sorghum grains and lespedeza hay for all early-season forecasts, but are fairly small for other items by October or earlier.

Percentage of Year-to-Year Changes in Production Predicted by Early-Season Estimates.--Another way to study the usefulness of the early-season production forecasts in connection with price or utilization forecasts is in terms of the percentage of variation of the year-to-year changes in production that can be forecast by making use of early-season estimates. These are shown in detail in table 2 and summarized in figure 2 for the various crops, using a consistent time period to the extent possible.

Using monthly forecasts of production for 1936-53, only 68 percent of the year-to-year variation in the preliminary December estimate of the production of corn is associated with the July forecast, but this percentage increases to 88 in August, 97 in September and 99 in October. The analyses of

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5/ A standard deviation is a measure of the amount of scatter or dispersion about an average. It is characteristic of a normal distribution that the average plus or minus one standard deviation ordinarily includes about two-thirds of the observations. In this study, the average difference over a long period of time is assumed to be zero.

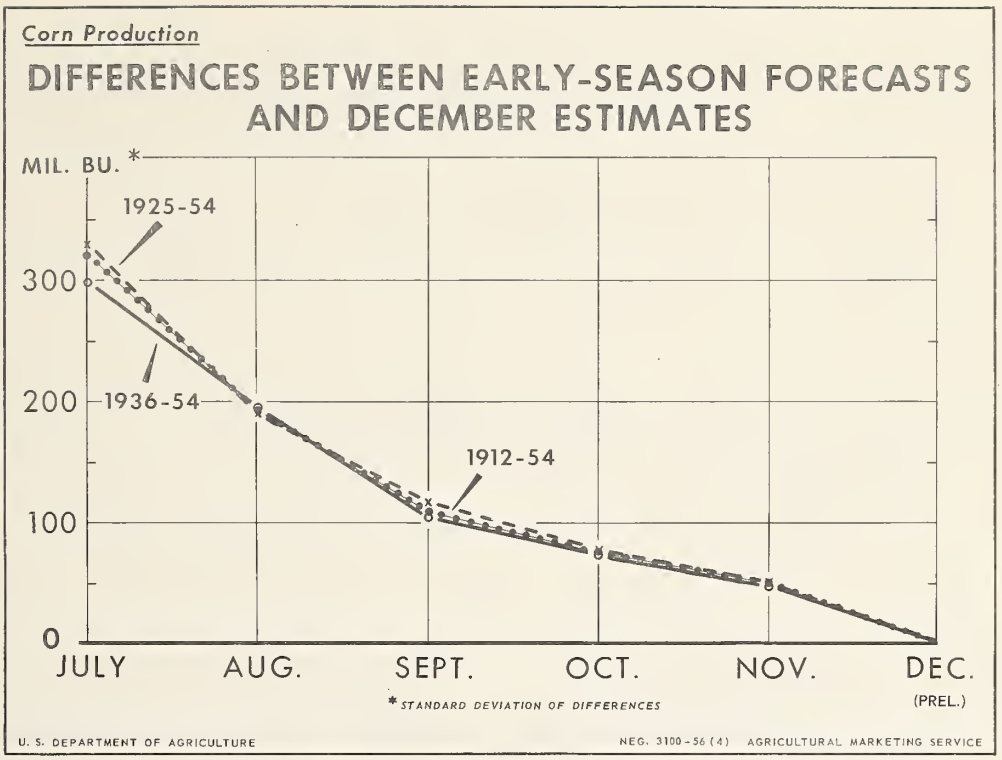

Figure 1

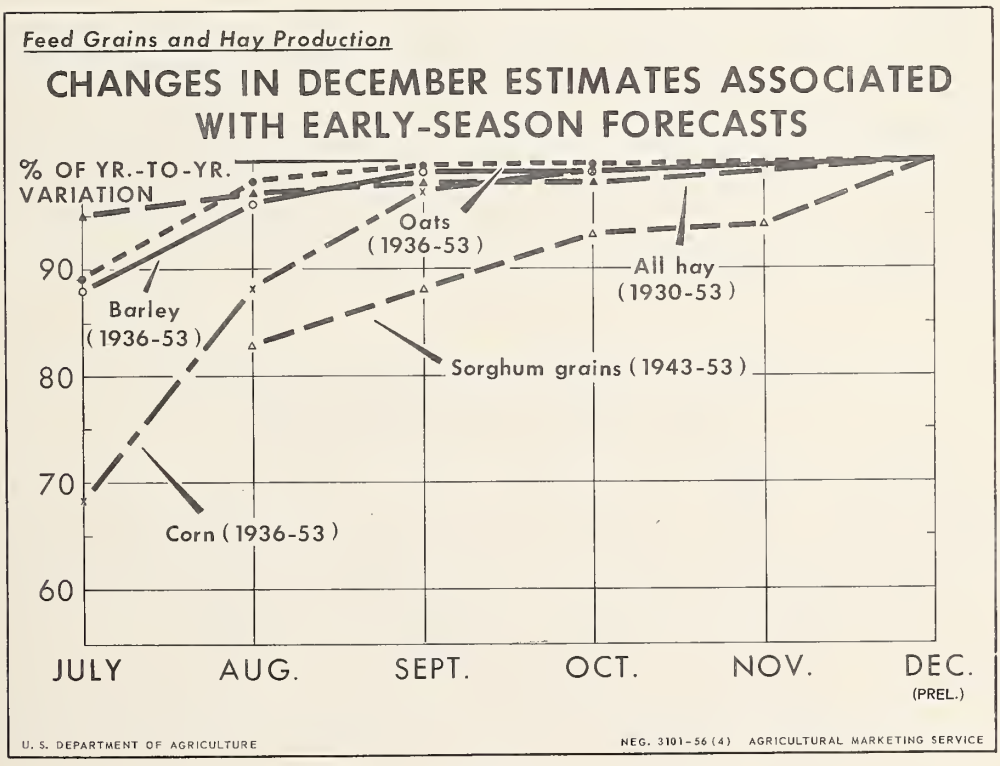

Figure 2

oats show that the first forecast in July is associated with about 89 percent of the year-to-year changes in the December production estimate, and this increases to 98 in August, and to more than 99 in September and October. For barley, the July forecast is associated with 88 percent of the year-to-year variation in December, and this increases to 96 percent in September and October. The first forecast for sorghum grains is published in August. Based on data for 1943-53, a percentage of associated variation of 83 is indicated for forecasts made in that month. This percentage increases steadily to 94 in November. Percentage adjustments after December have been 1 percent or less, on the average, for all feed grains.

For the years 1930-53, about 95 percent of the year-to-year variation in the preliminary December estimate of total hay production is accounted for by the July forecast, and this increases to 98 percent by October. Similar coefficients for alfalfa range between 90 and 97 percent for July through October in the period 1927-53, and for clover and timothy they range between 97 and 98 percent for July through September for the years 1935-53. On the average, percentage adjustments of about 10 percent occur when revisions of these crops are considered in the following December. When census data become available, a correction of 5 percent occurs for clover and timothy and nearly 15 percent for alfalfa and all hay. Data on lespedeza hay are available only from 1947 to date. Analyses for 1947-53 indicate that about 78 percent of the year-to-year variation in the December estimate is associated with the last forecast made on October 1, but revisions after the preliminary December estimate were minor.

Results of a Test for Statistical Bias.--Most analysts use production forecasts as the best early-season indication of the probable size of a crop. This procedure is valid only when the regression coefficient between the crop and the forecast, or between the change in the crop and the change in the forecast, is close to 1, and the constant value in the equation is close to zero. The usual Student's t-test for statistical significance was made and it was found that coefficients for most of these crop forecasts do not differ significantly from the above criteria. Thus, no significant statistical bias is indicated for these forecasts.

Supply and Utilization of Feed Concentrates and Number of Animal Units Fed

Forecasts of supply and demand factors are found in certain issues of The Feed Situation. These are presented in a table on the feed concentrate balance and relate to the supply and utilization of feed concentrates and the number of animal units to be fed. In most cases, forecasts for a particular October-September feeding year begin in July--three months prior to its commcement--and are continued in successive Situations throughout the feeding year. In the period covered by this study, "preliminary" estimates for the preceding feeding year are published in the October Situation; a "revised" estimate is given in the December Situation and reflects adjustments in crop production

estimates. Data given in Grain and Feed Statistics through 1954 6/ are taken as "final" for the respective series, although more recent revisions have become available since the completion of this study. The methodology used for analyses outlined in this section is similar to that discussed for the forecasts of crop production.

Data considered in these analyses are stocks of feed concentrates both at the beginning and at the end of the feeding year; total production of feed grains, other grains fed, and byproduct feeds fed; total supply of feed concentrates; total concentrates fed; feed grains for seed, human food, industry, and export; livestock production units; and number of grain-consuming animal units fed annually. Data relating to forecasts for the factor last named are available for years beginning in 1939; recorded forecasts for all other series begin with 1944. Forecasts of livestock production units have not been made regularly and only those appearing in outlook issues of the Situation are studied. Because of a lack of sufficient data, analyses are made in terms of standard deviations only.

Standard deviations for the above series are shown in the upper section of table 3 in terms of million tons or million units and as a percentage of the average for the series. Percentagewise, the differences between forecasts and preliminary October figures at the close of the feeding year are relatively large for other grains fed, which is made up of domestic wheat and rye and imported grains fed. However, this series currently represents only about 2 to 3 percent of the total supply of feed concentrates. Differences in percentage terms for stocks at the end of the feeding year are similarly large through December of the feeding year beginning in October. Nevertheless, for neither series do differences exceed normal year-to-year variation.

Early-season forecasts of feed concentrates were studied also in terms of the percentage of variation of year-to-year changes in the various series. These are given in the lower section of table 3. As might be expected, 99 percent of the variation in stocks of feed grains as of the start of the feeding year can be forecast as early as July. Total production of feed grains (corn, oats, barley, and sorghum grains) give results by October that are almost as good. Year-to-year changes in the first forecast in July were found to be associated with 85 percent of the variation in the preliminary October figure. This increases to more than 99 percent in October and continues high through the remainder of the feeding year. These production estimates are based entirely on figures of the Crop Reporting Board.

6/ Grain and Feed Statistics. U. S. Dept. Agr. Statis. Bul. 159, pp. 2-3. 1955.

Byproduct feed production is distributed fairly evenly throughout the year. Total supplies of byproduct feeds do not change greatly from one year to the next, although an upward trend in quantity has taken place over the past 30 years. These analyses indicate that year-to-year changes in the quantity of byproduct feeds available for feeding cannot be predicted with any degree of reliability until the second half of the feeding year being considered. Percentages of associated variation are less than 50 percent for forecasts issued in July through December for the feeding season beginning in October. However, the estimate published in the April-May Situation, approximately 5 months before the end of the feeding year, is associated with 87 percent of the year-to-year changes in the preliminary figure. The percentage increases to 91 percent in July and remains at this level through the end of the feeding year.

Advance forecasts of "other grains fed" present a less favorable pattern. Year-to-year changes in the forecasts account for less than 50 percent of the year-to-year changes in the preliminary October estimate throughout the feeding year. Domestic wheat fed usually makes up the bulk of this item, and wheat feeding is a small and residual part of total wheat utilization. The two items--byproduct feeds and other grains fed--normally represent only about 15 percent of the total supply of feed concentrates.

When forecasts of total supply of feed concentrates are considered, however, the July forecast prior to the start of the feeding year is associated with approximately 91 percent of the year-to-year changes in the preliminary figure; increases to 97 percent, in October at the beginning of the feeding season, and to 98 percent when the feeding year is concluded in September.

In the case of feed grains for human food, seed, industry, and export, year-to-year changes in the preliminary October figure are associated with about 83 percent of the changes in the aggregate forecast at the start of the feeding year in October, but this percentage rises to more than 99 percent by September. Year-to-year changes in forecasts of total concentrates fed and in total utilization made at the beginning of the feeding season produce associations of 69 and 76 percent, respectively, and at the end of the feeding year account for approximately 97 and 98 percent, respectively, of the variation in the preliminary October estimate.

For the series on carryover stocks at the end of the feeding year, the year-to-year changes in forecasts made at the start of the feeding year account for approximately 63 percent of the variation in the preliminary October figure. The percentage of associated variation improves as the feeding season progresses, and 99 percent of the changes in the preliminary estimate are accounted for by year-to-year changes in forecasts appearing in the July Situation.

Forecasts at the start of the feeding season in October of grain-consuming animal units fed annually were found to be associated with 93 percent of the variation in the preliminary figure. This percentage increases steadily through the feeding year and at its close accounts for more than 99 percent of the variation in the preliminary October estimate.

With the exception of other grains fed, total concentrates fed, and total utilization, percentage adjustments after the October estimate at the close of the feeding year have been 2 percent or less, on the average, for all series. For other grains fed, a sizable correction of almost 20 percent, on the average, is made after revisions are taken into consideration in December; adjustments of 5 percent, on the average, were made for both total concentrates fed and total utilization. When census benchmark data become available, a correction of almost 25 percent occurs for other grains fed, 10 percent for total concentrates fed, and 7 percent for total utilization.

Estimates of Season-Average Price

Two sets of estimates of season-average prices for the United States are published and successively revised. Essentially, these represent estimates of the season-average price received by farmers in individual States, weighted by estimated quantities (1) produced and (2) sold to derive average prices for the country for the crop year. The estimates include allowances for quantities bought by the Government under purchase agreements and loan quantities unredeemed (and therefore considered sold to the Government) at the end of the crop marketing season. The first estimate of the season-average price weighted by production is published in December following harvest; it is revised the following December. In May following harvest of a crop, an estimate of the season-average price weighted by sales is published; this is revised a year later. Each series is again revised, if necessary, when census data on production and sales become available. As for the production analyses discussed previously, these successive estimates are referred to as "preliminary," "revised," and "final" estimates.

In connection with the several available estimates of season-average prices, the analyst is interested chiefly in the extent to which one series can be substituted for another as a measure of year-to-year change, as they are published at different times. Pertinent data are shown in table 4.

The first two lines of table 4 show percentage relationships between year-to-year changes in final estimates of season-average prices weighted by production and simple averages for the months in the marketing year. With the exception of sorghum grains, year-to-year changes in simple averages are associated with at least 96 percent of the year-to-year variation in the weighted average. The other lines in the table present percentage relationships between preliminary weighted average prices and averages published at a later date.

For example, an analyst might wish to know how well the price weighted by production issued in December would estimate the price weighted by sales issued in the following May. This comparison is shown in line 4. For barley and sorghum grains the relationship is very close; but for hay, the associated variation is only 78 percent. The relationship existing between the preliminary December estimate and its revised figure published a year later is shown in line 5. With the exception of corn, much of which is sold after December, the year-to-year changes in the preliminary December estimate are associated with not less than 96 percent of the year-to-year changes in the revised December estimate. For corn, this percentage is 92.

When the revised December figure is issued, the analyst has a choice of using this to estimate the revised May figure or of using the preliminary May figure. These comparisons are shown in the last two lines. Here the percentages suggest that the revised December estimate is somewhat preferable to the preliminary May estimate, except for hay. The preliminary May figure is preferable for hay; this indicates the importance of weighting by sales.

A comparison of the degree of correlation between the revised May and the revised December figure indicates the extent to which weighting data for individual States by (1) production and (2) sales makes a difference in the end result. This comparison is shown in the last line. For all commodities except hay, the difference is negligible.

The analysis between year-to-year changes in the final estimates of season-average prices weighted by production and the revised December estimates, shown in line 3, indicates that changes normally are negligible when census data are used for weighting purposes for the feed grains. For hay, however, revisions based on use of census data for weights are important.

Table 1.-- Production of feed grains and hay: Standard deviations of differences between December estimates and early-season forecasts and of year-to-year changes

Item	Corn						Oats						Barley					
	1912-54		1925-54		1936-54		1912-54		1925-54		1936-54		1912-54		1925-54		1936-54	
	Actual	Percentage 1/	Actual	Percentage 1/	Actual	Percentage 1/	Actual	Percentage 1/	Actual	Percentage 1/	Actual	Percentage 1/	Actual	Percentage 1/	Actual	Percentage 1/	Actual	Percentage 1/
	Mil. bu.	Pct.	Mil. bu.	Pct.	Mil. bu.	Pct.	Mil. bu.	Pct.	Mil. bu.	Pct.	Mil. bu.	Pct.	Mil. bu.	Pct.	Mil. bu.	Pct.	Mil. bu.	Pct.
Difference between--																		
Preliminary December estimate and forecast in--																		
July	319	12	328	12	299	10	116	9	94	8	81	7	25	10	24	9	20	7
August	192	7	191	7	193	7	66	5	47	4	38	3	13	6	11	4	12	4
September	109	4	116	4	105	4	40	3	24	2	23	2	9	4	7	3	7	2
October	75	3	76	3	73	3	25	2	22	2	20	2	9	4	7	3	6	2
November	49	2	49	2	47	2	---	---	---	---	---	---	---	---	---	---	---	---
	1912-49		1925-49		1936-49		1912-49		1925-49		1936-49		1912-49		1925-49		1936-49	
Revised December estimate and-- Preliminary December 2/	43	2	40	2	40	1	23	2	26	2	16	1	5	2	5	2	2	1
Final estimate	76	2	66	2	43	2	52	4	46	4	26	2	13	6	10	4	2	1
Year-to-year change in final estimate	516	19	564	21	603	21	279	22	275	23	255	21	67	28	78	29	66	23

Item	Sorghum grains 1943-54		Hay													
			Alfalfa				Clover and timothy 1935-54		Lespedeza 1947-54		All					
			1927-54		1936-54						1930-54		1947-54			
	Actual	Percentage 1/	Actual	Percentage 1/	Actual	Percentage 1/	Actual	Percentage 1/	Actual	Percentage 1/	Actual	Percentage 1/	Actual	Percentage 1/		
	Mil. bu.	Pct.	Mil. tons	Pct.	Mil. tons	Pct.	Mil. tons	Pct.	Mil. tons	Pct.	Mil. tons	Pct.	Mil. tons	Pct.		
Difference between--																
Preliminary December estimate and forecast in--																
July	---	---	1.8	6	1.4	4	1.3	4	1.2	19	4.4	5	3.1	3		
August	29	22	1.5	5	1.3	4	1.1	4	.9	13	3.7	4	2.9	3		
September	25	19	1.5	5	1.2	4	1.0	4	.7	10	3.5	4	2.0	2		
October	22	17	1.2	4	1.0	3	---	---	.6	9	3.6	4	2.0	2		
November	18	13	---	---	---	---	---	---	---	---	---	---	---	---		
	1943-49		1927-49		1936-49		1935-49				1930-49					
Revised December estimate and-- Preliminary December 2/	1	1	1.2	4	0.5	1	0.9	3	.1	1	4.4	5	1.6	2		
Final estimate	3	3	2.1	7	.9	3	1.2	4	---	---	2.3	3	---	---		
Year-to-year change in final estimate	51	41	3.8	13	2.7	9	4.3	15	---	---	11.0	13	---	---		

1/ Standard deviation expressed as a percentage of average crop reported in December following.
2/ Periods end with 1953.

Table 2.- Production of feed grains and hay: Percentage of variation in year-to-year changes in specified estimates associated with specified early-season forecasts 1/

Item	Corn			Oats			Barley			Sorghum grains	Hay					
											Alfalfa		Clover and timothy	Lespedeza	All	
	1912-53	1925-53	1936-53	1912-53	1925-53	1936-53	1912-53	1925-53	1936-53	1943-53	1927-53	1936-53	1935-53	1947-53	1930-53	1947-53
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
Change in preliminary December estimate associated with change in production forecast in--																
July	60	62	68	84	88	89	88	91	88	---	90	81	97	9	95	88
August	87	88	88	95	97	98	96	98	96	83	94	88	98	46	97	91
September	96	96	97	98	99.2	99.5	98	99.2	99.0	88	94	91	98	73	98	99.3
October	98	98	99.0	99.2	99.3	99.6	98	99.3	99.0	93	97	95	---	78	98	99.1
November	99.3	99.5	99.5	---	---	---	---	---	---	94	---	---	---	---	---	---
Change in revised December estimate associated with preliminary December estimate	99.4	99.5	99.5	99.3	99.0	99.5	99.5	99.6	99.9	99.9	90	96	91	99.6	91	86
	1912-49	1925-49	1936-49	1912-49	1925-49	1936-49	1912-49	1925-49	1936-49	1943-49	1927-49	1936-49	1935-49		1930-49	
Change in final estimate associated with revised December estimate	99.3	99.5	99.6	99.0	99.1	99.8	99.0	99.5	99.9	99.7	87	95	94	---	84	---

1/ See text for exact variables used.

Table 3.--Supply and utilization of feed concentrates and animal units fed: Comparison of final estimates with specified early-season estimates, 1944-53

Standard deviation 1/

Item	Supply										Utilization						Stocks end of feeding year		Grain-consuming animal units fed 2/		Livestock production units	
	Stocks beginning of year		Production of feed grains		Byproduct feeds fed		Other grains fed		Total		Feed grains for food, seed, industry and export		Concentrates fed		Total							
	Actual	Percentage	Actual	Percentage	Actual	Percentage	Actual	Percentage	Actual	Percentage	Actual	Percentage	Actual	Percentage	Actual	Percentage	Actual	Percentage	Actual	Percentage	Actual	Percentage
	Mil. tons	Pct.	Mil. tons	Pct.	Mil. tons	Pct.	Mil. tons	Pct.	Mil. tons	Pct.	Mil. tons	Pct.	Mil. tons	Pct.	Mil. tons	Pct.	Mil. tons	Pct.	Mil.	Pct.	Mil.	Pct.
Difference between--																						
Preliminary October estimate and forecast in months--																						
Prior to start of feeding year:																						
July	1.0	5	8.7	7	3/	---	3/	---	9.4	6	2.3	14	8.3	7	9.5	7	3/	---	4.6	3	---	---
August-September	1.0	5	3.5	3	1.2	6	2.2	41	4.4	3	1.9	11	5.0	4	5.4	4	5.5	30	3.8	2	---	---
Within feeding year:																						
October	.5	3	2.5	2	.8	4	2.0	36	3.4	2	1.4	8	5.0	4	5.2	4	5.3	29	3.4	2	4.9	3
December	.3	2	0	0	.8	4	1.8	32	1.5	1	1.3	7	4.1	3	4.2	3	3.7	20	2.4	2	---	---
April-May	.3	2	0	0	.3	2	1.4	25	1.2	1	.6	4	3.2	3	2.9	2	1.9	10	1.2	1	---	---
July	.3	2	0	0	.3	2	.8	14	1.2	1	.6	4	1.5	1	1.4	1	.8	4	.4	4/	---	---
August-September	.3	2	0	0	.3	2	.5	10	1.2	1	.4	2	1.7	1	1.5	1	.7	4	0	0	---	---
Revised December estimate and--																						
Preliminary October	.3	2	1.5	1	.1	1	.6	10	2.2	1	.3	2	2.0	2	2.2	2	.5	3	1.2	1	5/2.6	5/2
Final estimate	.5	3	1.8	2	.4	2	.8	15	2.3	1	.2	1	2.2	2	2.2	2	.4	2	1.3	1	---	---
Year-to-year changes in final estimate for--																						
1926-53	6.7	45	19.6	19	.7	4	2.6	49	16.9	12	2.4	19	11.9	11	12.6	10	6.7	43	9.2	6	8.5	5
1944-53	9.0	46	18.3	16	.9	4	2.4	44	15.1	9	3.5	21	8.0	6	9.0	6	8.7	47	10.7	7	6.8	4
	Percentages of variation associated 6/																					
Change in preliminary October estimate associated with change in months--																						
Prior to start of feeding year:																						
July		99.0		85		3/		3/		91		3/		3/		3/		3/		3/		
August-September		99.0		99.0		25		7/37		96		3/		3/		3/		3/		91		
Within feeding year:																						
October		99.6		99.1		31		7/37		97		83		69		76		63		93		
December		99.8		99.4		38		7/37		98		86		74		82		81		94		
April-May		99.9		99.4		87		7/37		99.0		95		92		97		98		96		
July		99.9		99.4		91		7/37		98		98		95		97		99.0		98		
August-September		99.9		99.4		91		7/37		98		99.4		97		98		98		99.9		
Change in revised December estimate associated with change in--																						
Preliminary October		99.9		99.4		98		81		99.0		99.7		95		95		99.7		99.0		
Final estimate		99.7		99.0		99.0		76		98		99.6		90		93		99.7		99.0		

1/ Shown in actual terms and as percentage of the average final estimate for the period.
2/ Period begins with 1939.
3/ Insufficient data for analysis.
4/ Less than 1 percent.
5/ Relationship between preliminary October and the final estimate.
6/ Based on 1945-53.
7/ Average value; coefficients exhibited erratic pattern, but successive values did not differ from each other by a statistically significant amount.

Table 4.--Season average price for feed grains and hay: Percentage of variation in year-to-year changes associated with specified early estimates 1/

Item	Corn	Oats	Barley	Sorghum grains	All hay
	Pct.	Pct.	Pct.	Pct.	Pct.
1910-53:					
Final estimate weighted by production associated with simple average price	98	97	96	2/91	---
1940-53:					
Final estimate weighted by production associated with--					
Simple average price	97	97	96	84	98
Revised December	99.9	99.9	99.9	99.4	95
Preliminary May estimate associated with preliminary December	97	98	99.0	99.0	78
Revised December estimate associated with preliminary December	92	97	98	96	97
Revised May estimate associated with--					
Preliminary May	96	99.4	99.5	99.2	99.3
Revised December	99.9	99.8	99.6	99.4	80

1/ See text for exact variables used.
2/ Period studied was 1924-53.